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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/067,260	02/07/2002	Wen-Bin Tsai	147268.00338	6663

7590

08/28/2003

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EXAMINER

AHMED, SHAMIM

ART UNIT

PAPER NUMBER

1765

DATE MAILED: 08/28/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

72-3

<b>Office Action Summary</b>	<b>Application No.</b> 10/067,260	<b>Applicant(s)</b> TSAI ET AL.	
	<b>Examiner</b> Shamim Ahmed	<b>Art Unit</b> 1765	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 07 February 2002.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-21 is/are pending in the application.  
     4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 8-21 is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
     If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \*    c) ☐ None of:  
         1. ☐ Certified copies of the priority documents have been received.  
         2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
         3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
     \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
     a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                  | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____                                    |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 4-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al (6,123,865) in view of Ziger (5,310,457).

Lin et al disclose an etching process for insulating layer of silicon oxide layer, wherein a mixture of sulfuric acid, hydrofluoric acid and phosphoric acid can be used as an etching composition (col.2, lines 31-38).

Lin et al fail to disclose that the substrate is placed into the etching solution with a flow rate.

However, in a method of etching insulation layer, Ziger teaches that the substrate is placed into an etch bath and also teaches that the etching bath is replenishing with fresh solution and thereby having a flow in the etching solution (col.2, lines 21-28).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to combine Ziger's teaching into Lin et al's process for uniform dispersion of the etching constituents in the solution for providing a relatively constant etch rates as taught by Ziger.

As to claims 4-6, modified Lin et al teaches that the etch rate depends on the concentration or other variables but does not explicitly teach the exact ratio of the composition and also the etch rate.

However, it would have been obvious to one skilled in the art at the time of claimed invention to optimize, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPOA 1980).

3. Claims 1 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huh et al (5,622,636).

Huh et al disclose wet etching process for insulating layer using an etchant solution includes one of a hydrofluoric (HF),  $\text{H}_3\text{PO}_4$ ,  $\text{H}_2\text{SO}_4$  (col.3, lines 60-65).

Huh et al fail to teach that the etching solution is a mixture of hydrofluoric (HF),  $\text{H}_3\text{PO}_4$ ,  $\text{H}_2\text{SO}_4$ .

However, Huh et al teach that either hydrofluoric (HF) or  $\text{H}_3\text{PO}_4$  or  $\text{H}_2\text{SO}_4$  can be used to the etching solution for the same purpose.

Therefore, it would have been obvious to one skill in the art to add a mixture of hydrofluoric (HF),  $\text{H}_3\text{PO}_4$ ,  $\text{H}_2\text{SO}_4$  into the etchant solution because all of them are functionally equivalent as taught by Huh et al for the same purpose.

Furthermore, it has been held that it is prima facie obvious to combine two compositions each taught by the prior art to be useful for the same purpose, in order to

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form a third composition which is to be used for the very same purpose. See In re Kerkhoven, 205 USPQ 1069, 1072.

As to claim 7, Huh et al teach that the insulation layer is silicon oxide (col.4, lines 11-16).

4. Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huh (5,622,636) as applied to claims 1 and 7 above, and further in view of Berkenblit et al (4,106,975).

Huh et al discussed above in the paragraph 3 but fail to disclose the exact concentration of the etching constituents.

However, in a method of anisotropic wet etching insulation material such as aluminum oxide, Berkenblit et al teach that a mixture of 98% sulfuric acid and 85% phosphoric acid by weight are used for efficient anisotropic profile of the substrate (col.8, lines 7-12 and lines 40-48).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to combine Berkenblit et al's teaching into Huh et al's process for efficient anisotropic profile of the etched substrate as taught by Berkenblit et al.

#### ***Allowable Subject Matter***

5. Claims 8-21 are allowed.

6. The following is a statement of reasons for the indication of allowable subject matter: The prior art does not teach or suggest patterning the second insulation layer to form a protrusions in the large trenches having a distance between the neighboring

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protrusions is about the same as the width of the small trenches as the context of claims 8 and 16.

7. The closest prior art Liu (6,245,683) disclose insulating a substrate of another insulating layer having trenches but fail to teach that the patterning of the insulating layer over the layer with trenches to form protrusions.

### ***Conclusion***

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Lee et al (6,447,694), Lur et al (5,294,562) disclose conventional polishing or planarizing of insulating layer. JP-11-286791 disclose a process of anisotropic etching of insulating material using conventional solution.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (703) 305-1929. The examiner can normally be reached on M-Thu (7:00-5:30) Every Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G Norton can be reached on (703) 305-2667. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Shamim Ahmed

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NADINE G. NORTON  
PRIMARY EXAMINER

A handwritten signature in black ink, appearing to read "Nadine", written in a cursive style.